HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Issaquah Fall Chinook Program
Species or Hatchery Stock:	Fall Chinook (Onchorynchus tshawytscha) Issaquah Creek
Agency/Operator:	Washington Department of Fish and Wildlife
Watershed and Region:	Lake Washington Puget Sound
Date Submitted:	August 23, 2002
Date Last Updated:	August 21, 2002

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Issaquah Fall Chinook (Lake Washington) Fingerling Chinook Program

1.2) Species and population (or stock) under propagation, and ESA status.

Issaquah Creek Fall Chinook (*Oncorhynchus tshawytscha*)

1.3) Responsible organization and individuals

Name (and title):	Chuck Phillips, Region 4 Fish Program Manager Doug Hatfield, Snohomish Complex Manager	
Agency or Tribe:	Washington Department of Fish and Wildlife	
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

In addition to the on-station production at Issaquah Hatchery, eggs are given to local schools.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

Funding for this program is provided through the State General Fund.

1.5) Location(s) of hatchery and associated facilities.

Issaquah Hatchery: Issaquah Creek (08.0178) RM 3 in downtown Issaquah.

1.6) Type of program.

Isolated harvest

1.7) Purpose (Goal) of program.

Augmentation

The goal of this program is to provide fish for harvest opportunity. Presently, all fish are mass marked (adipose-fin clip only) that can provide data on the NOR/HOR spawning ground ratios.

1.8) Justification for the program.

This program will be operated to provide fish for harvest while minimizing adverse genetic, demographic or ecological effects on listed fish. This will be accomplished in the following manner:

1) Juvenile chinook will be released as smolts to minimize emigration time to saltwater thereby minimizing potential competition with and predation on natural-origin listed fish.

2) Juvenile chinook will be released after the usual wild chinook emigration time to minimize potential adverse interactions.

3) All juvenile chinook released will be acclimated at a hatchery facility capable of trapping the majority of returning adults. This practice will minimize straying and make possible the removal or regulation of hatchery fish allowed to spawn naturally.

4) All juvenile chinook will be mass marked with an adipose fin clip to distinguish them from wild or hatchery spawning chinook.

5) Adult chinook produced from this program will be harvested at a rate that allows adequate escapement of listed chinook .

1.9) List of program "Performance Standards".

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

Performance Standards and Indicators for Puget Sound **Isolated Harvest** Chinook programs.

Performance Standard	Performance Indicator	Monitoring and Evaluation Plan
Produce adult fish for harvest	Survival and contribution rates	Monitor catch and CWT data.
Meet hatchery production goals	Number of juvenile fish released - **2,000,000**	Future Brood Document (FBD) and hatchery records

Manage for adequate escapement where applicable	Hatchery return rates	Monitoring hatchery return rates through trapping and hatchery records.
Minimize interactions with listed fish through proper broodstock management and mass marking. Maximize hatchery adult capture effectiveness. Use only hatchery fish	Total number of broodstock collected - **1,600 adults**	Rack counts and CWT data Hatchery records
	Stray rates **<4% inside GDU; dependent on acceptable risk profile** **<1% outside GDU. Need CWT group on these fish**	Spawning guidelines
	Sex ratios	Hatchery records
	Age structure	
	Timing of adult collection/spawning - **late August to mid-October**	
	Total number of wild adults passed upstream -**currently unknown, will know starting in 2003**	
	Number wild fish used in broodstock - **to be determined**	
	Return timing of hatchery / wild adults - **late August to mid-October**	

Spawning guidelines

	Adherence to spawning guidelines - **1:1 with no backup males used. 2% of jacks used.**	
Minimize interactions with listed fish through proper rearing and release strategies	Juveniles released as smolts	FBD and hatchery records
	Outmigration timing of listed fish / hatchery fish **early May/mid-May**	FBD and historical natural out-migrant data FBD and hatchery records
	Size and time of release **80 fpp/ mid-May release**	
Maintain stock integrity and genetic diversity	Effective population size	Spawning guidelines
	Hatchery-Origin Recruit spawners	
Maximize in-hatchery survival of broodstock and their progeny; and Limit the impact of pathogens associated with hatchery stocks, on listed fish	Fish pathologists will monitor the health of hatchery stocks on a monthly basis and recommend preventative actions / strategies to maintain fish health	Co-Managers Disease Policy Fish Health Monitoring Reports
	Fish pathologists will diagnose fish health problems and minimize their impact	
	Vaccines will be administered when appropriate to protect fish health	

	A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings	
	Fish health staff will present workshops on fish health issues to provide continuing education to hatchery staff.	
Ensure hatchery operations comply with state and federal water quality standards through proper environmental monitoring	NPDES compliance	Monthly NPDES records

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

1,600 adults.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

Life Stage	Release Location	Annual Release Level
Eyed Eggs		
Unfed Fry		
Fry		
Fingerling	Issaquah Creek (08.0178)	2,000,000
Yearling		

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Fish have not recently been coded-wire tagged to provide current smolt-to-adult survival rates. The last brood year tagged was 1987. There is a need to Ad + CWT a portion of release group to provide relative data (see Section 1.7). Escapement to the hatchery for return years 1995 through 2001 was 2,180, 1,248, 3,940, 4,877, 2,246, 4,134 and 10,519, respectively.

1.13) Date program started (years in operation), or is expected to start.

The chinook program at Issaquah Hatchery started in 1939.

1.14) Expected duration of program.

Ongoing

1.15) Watersheds targeted by program.

Lake Washington and Issaquah Creek (08.0178).

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

None.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

- Identify the ESA-listed population(s) that will be directly affected by the program.

Issaquah (Lake Washington) Summer/Fall Chinook

Age information for naturally spawning chinook in the Lake Washington basin is very limited. The mean age ratio of chinook sampled at the Cedar River Sockeye Broodstock collection weir in 1998 was 5.88% age 2, 23.53% age 3 and 70.59 age 4. There were no age 5 or age 6 in the sample. The adult sex ratio of sampled chinook in 1998 was 79% male and 21% female. Age 3 adults averaged 65.5 centimeters (cm) and age 4 adults averaged 86.4 cm.

Most naturally-spawned Lake Washington chinook migrate to salt water after spending only a few months in freshwater. Arrival of both hatchery and naturally-produced smolts in the estuary peaks in late May, and after a few weeks, most begin moving to near-shore feeding grounds in Puget Sound and the Pacific Ocean. Sexually mature fish begin arriving back at the Ballard Locks as early as June. The peak counts at the Chittenden Locks is usually in early to mid-August.

-Identify the ESA-listed population(s) that may be incidentally affected by the program.

N. Lake Washington Tribs Summer/Fall Chinook, Cedar River Summer/Fall Chinook

There are naturally spawning adult chinook in tributaries throughout the Lake Washington basin, however, their genetic origin is uncertain. There are genetically distinct chinook in the Cedar River. Adults spawn in the mainstem Cedar River from about river mile 1.0 in Renton to the City of Seattle water pipeline crossing at river mile 21.3. In 1999, 81% of the chinook redds were observed above river mile 6.5 and the first redd observed was on August 18. Spawning activity peaks in early October and is generally complete by early to mid-November. Big Bear/Cottage, Issaquah, and Kelsey Creeks also have significant numbers of spawners. Recent genetic testing (Marshall, 1999) of Bear/Cottage Lake Creeks (N. Lake Washington tribs) chinook imply that the population is a discrete, self-sustaining unit and are clearly distinct from the Cedar River chinook stock. It was also

indicated that the Bear/Cottage Lake Creek stock is least differentiated from the Issaquah Hatchery (Green River lineage) population.

2.2.2) Status of ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds

Critical and viable population threshholds under ESA have not been determined, however, the SASSI report (WDFW) determined this population (Issaquah (Lake Washington) Summer/ Fall Chinook) status to be "healthy".

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

-Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Live count Area Under the Curve index spawning escapement estimates for the Cedar River mainstem, Bear Creek and Cottage Lake creeks. There is no expansion to un-surveyed sections or for fish not seen (WDFW data).

Return Year	Cedar	Cottage	Bear	System Total
1983	788	403	141	1332
1984	898	264	90	1252
1985	766	124	59	949
1986	942	386	142	1470
1987	1540	226	272	2038
1988	559	50	183	792
1989	558	208	245	1011
1990	469	161	157	787
1991	508	93	60	661
1992	525	75	190	790
1993	156	44	45	245
1994	452	186	250	888
1995	681	143	106	930
1996	303	6	19	328
1997	227	42	25	294
1998	432	192	73	697
1999	241	258	279	778

-Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

There are no direct estimates of hatchery-origin chinook on the spawning grounds due to lack of recent coded-wire tag releases in the Lake Washington system. The 2000 releases were 100% mass marked (adipose-fin clip only) so hatchery / wild percentages may be calculated starting in 2003. It is assumed that a high percentage of natural spawners in Issaquah Creek are of hatchery origin.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take *(see "Attachment 1" for definition of "take")***.**

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.

Broodstock collection - Take associated with broodstock collection is unknown as Issaquah hatchery chinook have not been mass marked or recently coded-wire tagged to differentiate them from naturally produced chinook.

Juvenile releases - Take associated with competition and predation of Issaquah Hatchery chinook on NORs is unknown. However, hatchery chinook are released after the NOR outmigration to reduce interactions.

Upstream passage - The hatchery weir/intake on Issaquah Creek diverts all returning adult chinook into the hatchery adult pond where they are sorted for spawning or passage upstream. This occurs during the normal adult return time of September and October. The risk of physical harm to the fish is low as the fish are processed frequently for spawning or passage upstream.

The upper intake (gravity intake) screens do not meet NMFS or State screening guidelines, but changes are forthcoming. In addition, the fish ladder at the gravity intake may cause passage delay during extremely low or high flows. For chinook the delay risk is low to moderate/low because the withdrawl of water for the hatchery is curtailed for low flow periods when chinook are present. WDFW and the Corp of Engineers are developing plans, under the COE 206 Habitat Restoration Authority, to replace and/or remodel the intake structure to bring it into full compliance for adult and juvenile passage.

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

Unknown.

- **Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

Unknown

-Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Take levels have been unknown so no contingency plans have been established. Starting in 2003, these hatchery fish will be identifiable. WDFW will consult with NMFS to develop a contingency plan and in any case where take levels are exceeded or are projected to exceed the take levels in the plan, WDFW will consult with NMFS in a timely manner.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. Hood Canal Summer Chum Conservation Initiative) or other regionally accepted policies (e.g. the NPPC Annual Production Review Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

None

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

Puget Sound Management Plan

The WDFW and the Muckleshoot Tribe agreed to and signed a "Production/Mass Marking Agreement" in April 2000. The parties agree that production at the Issaquah Hatchery will be 2.0 million chinook fingerlings.

3.3) Relationship to harvest objectives.

Recently, there has been little harvest opportunity on these artificially produced chinook. Because the hatchery chinook inter-mix with naturally produced Lake Washington stocks, we have not had a targeted chinook fishery on adult chinook in marine areas. There has been a limited sport fishery in Lake Sammamish in 1998 and 1999 to target Issaquah hatchery chinook. It is believed that very few of the naturally produced north Lake Washington tributary stocks and Cedar River chinook migrate into Lake Sammamish. There is a need to coded-wire tag a portion of the Issaquah Creek chinook release to evaluate the migration routes, catch contributions, total survival, run timing and straying into other watersheds.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The last brood year of fingerling chinook that was coded-wire tagged and released from the Issaquah Hatchery was the 1987 brood year. Therefore, recent detailed harvest contributions are not possible. However, it is reasonable to assume that they contribute to fisheries similar to Soos Creek fingerling releases.

3.4) Relationship to habitat protection and recovery strategies.

A major factor affecting natural production are losses at the Hiram Chittenden Locks at Ballard. There have been numerous improvements at the locks to improve downstream migration past the facility. Efforts have concentrated upon getting smolts past the facility without going through the filling culverts in the large locks. Operating procedures have changed during the spring and Corps of Engineers' (COE) personnel are now slowly filling the locks to reduce smolt entrainment. In addition to slow filling, there have been four smolt passage flumes installed at two of the spill gates to attract smolts and provide a safer exit from the forebay to salt water. There have been other improvements and a more detailed report is available from COE fishery biologists.

3.5) Ecological interactions.

Smolts from both the hatchery and wild components may compete for food in the stream below the hatchery release site or in Lakes' Sammamish and Washington during their out-migration. Recent studies of the early life history and lake residency of chinook in Lake Washington by the Muckleshoot Tribe illustrate the potential for competition between natural and Issaquah Hatchery chinook.

There are ongoing predation studies in Lake Washington and the ship canal by the USFWS and the Muckleshoot Tribe to determine chinook losses by smallmouth and largemouth bass, perch, cutthroat trout and other predators. The concerns are that the predation losses are significant to both hatchery and natural chinook.

Due to no recent tag data it is unknown whether these fish stray inside/outside the GDU.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

The main source of water is from the main fork of the Issaquah Creek. There are two intake sources on this stream. Located approximately three quarters of a mile up stream is a small dam with intake screens that feed water to the hatchery by gravity. This produces about 5,000 gallons per minute (gpm). There are also five pumps that provide 5,500 gpm. This is a small urban stream whose flow rates and heights change rapidly with weather conditions. The daily temperature differences can be 10º Fahrenheit between day and night and range from 30º to 75º Fahrenheit depending upon the time of year. NPDES permit # is WAG-133010

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

The upper intake screens do not meet NMFS screening guidelines, but changes are forthcoming. WDFW and the Corp of Engineers are developing plans, under the COE 206 Habitat Restoration Authority, to replace and/or remodel the intake structure to bring it into full compliance for adult and juvenile passage. The lower intake screens meet current guidelines.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

The Issaquah Hatchery has one adult collection facility. It is made up of two 100' X 20' X 6' adult capture ponds. An air-bladder weir is attached above the lower intake screens. This weir and a bar rack at the mouth of the by-pass fish ladder keep the fish from going upstream when trapping. Trapping begins at the end of August and ends in the middle of November. The fish are encouraged to migrate up the adult pond's fish ladder which its' entrance is at the base of the weir. The source of water for these ponds is pumped from the lower intake screens.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Does not apply

5.3) Broodstock holding and spawning facilities.

The collection facilities described in section 5.1 also serves as spawning facilities.

5.4) Incubation facilities.

At present eggs are reared in deep troughs, shallow troughs, and vertical Heath Techna incubators. After the year 2001 egg take, all eggs will be incubated in the vertical incubators.

5.5) Rearing facilities.

There are four sizes of rearing vessels used at Issaquah: 100' X 10' X 4', 100' X 20' X 4', 100' X 20' X 5', and 80' X 20' X 5'. Fish are reared in any combination of these ponds and released from these ponds into Issaquah Creek.

5.6) Acclimation/release facilities.

See section 5.5

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

Because surface water is the source for the hatchery, the threats from diseases and parasites present the most significant threat to fish health. The high sediment loads during flood conditions cause loss of growth and environmental health problems with the eggs and fish.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Issaquah Hatchery is staffed with four full time employees one of which is on a standby status 24 hours a day seven days a week. All staff are very familiar with the workings of the hatchery and have received training in fish cultural techniques and disease recognition and prevention issues. Additionally, pathology staff make frequent visits to the hatchery to check the health of fish stocks and are available immediately in case of a disease outbreak. The hatchery is equipped with a sophisticated alarm system that monitors flow and other conditions critical to hatchery operations. There is a standby power generator that is capable of supplying electrical needs to the pumps in case of a loss of power.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

The fall chinook stock originated from Green River transfers. Green River chinook were used to found production at the Issaquah Hatchery in 1937 (WDF, 1939). 1992 was the last year Issaquah received eggs from Green River. Adults are trapped at the hatchery for Issaquah's needs.

6.2) Supporting information.

6.2.1) History.

See section 6.1

6.2.2) Annual size.

1,600 adults.

6.2.3) Past and proposed level of natural fish in broodstock.

Lake Washington natural chinook adults that return to the Issaquah Hatchery are physically indistinguishable from hatchery adults. Therefore, a substantial number of natural fish may become part of the broodstock used for the hatchery program each year. Conversely, there are probably significant numbers of hatchery adults that do not return to the hatchery each year but, instead, become part of the naturally-spawning component of the stock. WDFW shall continue to use gametes procured from fall chinook adults volunteering to the Issaquah Hatchery to effect this program. The collection of localized hatchery-origin broodstock at this location will limit direct and incidental take effects on listed chinook salmon.

6.2.4) Genetic or ecological differences.

None

6.2.5) Reasons for choosing.

Locally adapted stock.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Starting with the 1999 brood year (2000 releases), fall chinook were mass marked by removing their adipose fin. When adult fish return to the trap, fish without adipose fins can be selected for broodstock and fish with their adipose fin intact could be returned to the river to spawn naturally.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults.

7.2) Collection or sampling design.

The adult trap and air-bladder weir is operated from the last week of August until mid-November. Trapping efficiency is very much dependent on water flows. During high water events(late October on) fish can either jump or swim over the air-bladder weir.

7.3) Identity.

See section 6.3 and 7.2.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

A total of 1,600 adults need to be collected to support the fall chinook sub-yearly program.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1988	495	864	635	2,293,000	
1989	781	2,692	31	3,655,000	
1990	1,135	4,406	91	4,807,000	
1991	357	1,109	51	1,473,100	
1992	198	599	289	845,400	
1993	483	2,676	41	1,807,000	
1994	502	3,201	43	2,538,200	
1995	677	461	1	3,041,800	
1996	330	348	2	1,240,000	
1997	645	758	9	2,829,000	
1998	577	605		2,894,000	
1999	544	574	39	2,394,500	
2000	559	603		2,454,000	
2001	579	592		2,766,000	

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Adult fish collected in surplus of broodstock and not killed are passed upstream and allowed to spawn naturally at this time.

7.6) Fish transportation and holding methods.

There is no transportation of adult fish. All adults are held in ponds described in section 5.1 of this document. Virtually all of the fish arrive at the hatchery green and must be held for a period of time (up to 30 days) until they are ripe. No antibiotics or chemicals are used on the adults.

7.7) Describe fish health maintenance and sanitation procedures applied.

See section 7.6

7.8) Disposition of carcasses.

Spawned or un-spawned carcasses are typically sold to a fish buyer otherwise all carcasses are disposed at a sanitary landfill.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Only marked adults could be used in the broodstock collection program (BY 2003).

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

The adults are chosen randomly over the whole run until the end of trapping.

8.2) Males.

No backup males are used. 2% of spawning males are jacks and no repeat spawners are used.

8.3) Fertilization.

Equal sex ratios and 1:1 individual matings are used. Extensive use of iodophore disinfectant is used to minimize contaminants and the spread of disease. Also a percentage of spawned adults are sampled for IHN.

8.4) Cryopreserved gametes.

Not used.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

No means to distinguish populations at this time. In the future, all hatchery production returning will be mass marked to differentiate between hatchery-origin and natural-origin fish.

SECTION 9. INCUBATION AND REARING -

Specify any management goals (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

See section 7.4.2 for number of eggs taken since 1988. No information given on survival rates to eye-up and/or ponding.

9.1.2) Cause for, and disposition of surplus egg takes.

Extra eggs are normally taken as a safeguard against potential incubation loss. But in recent years a greater emphasis has been placed on not exceeding the program goals.

9.1.3) Loading densities applied during incubation.

Typically fall chinook eggs average 1,450 eggs/lb at the time of fertilization. They are placed in deep troughs at 450,000/trough at a flow of 12 gpm, shallow troughs loaded at 120,000/trough at 8 gpm and vertical Heath Techna incubators loaded at 84,000/ stack at 4 gpm.

9.1.4) Incubation conditions.

Temperature of inflowing water is monitored and recorded daily. Dissolved oxygen is checked on an infrequent basis and silt management is accomplished by flushing trays and deep troughs and brushing screens. The eggs in the shallows and verticals have to be gently washed to remove silt.

9.1.5) Ponding.

A KD index of 1.97 - 2.00 is used as the criteria for initial ponding of fry. Typical ponding dates range from mid-December to mid-January and all pondings are forced.

9.1.6) Fish health maintenance and monitoring.

All incubators are subject to a daily 15 minute 1:600 drip of formalin for the control of fungus and disease in the trays. These treatments start 2 days after initial fertilization and continue until approximately 1 week from hatching. When eggs reach the "eyed" stage they are removed from the trays and shocked. At this point, all non-viable eggs are removed either by the use of an automated egg picker or by hand.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

With the introduction of creek water for fry incubation, the trays are flushed occasionally to minimize the risk of catastrophic loss due to siltation.

9.2) Rearing:

9.2.1) Provide survival rate data (average program performance) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available..

9.2.2) Density and loading criteria (goals and actual levels).

Numerous criteria are applied to these during their rearing cycle depending on their size, the pond style they reside in, water quality, water temperature, relative health and water condition. However, as a rule these fish are limited to a maximum of 3 lbs fish/gpm of flow until they have reached a size of 100 fish per pound (fpp).

9.2.3) Fish rearing conditions

Water temperatures are monitored on a daily basis, water flows are checked at least weekly. Each pond is monitored for loss and picked daily. Ponds are vacuumed on an as- needed basis (typically weekly). General health of fish is monitored by pathology staff on a monthly basis.

9.2.4) Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

Not available.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Not available.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/g.p.m. inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

The diets used to grow these fish are supplied by two different manufactures, BioOregon and Moore-Clark. The diets are typically "semi-moist" or "dry" in nature and include starter diets, crumbles and pellet type feeds. Daily percent of body weight fed varies depending on the size of the fish, water temperature and time of year. However, the range is usually from 1 - 3% B.W./day. Overall food conversion is typically 1.1-1.2:1.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

Sanitation procedures include the use of iodophore solutions as disinfectant for tools and nets and other equipment between ponds and stocks of fish. Fish Health staff monitor the fish on a bi-weekly basis and disease treatment is done on an as-needed basis.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

None

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

None

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.
Fish are reared to sub-yearling smolt size (zeros) to mimic the natural fish emigration strategy. In the future, all fish under propagation could be from marked hatchery-origin adults.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs				
Unfed Fry				
Fry				
Fingerling	2,000,000	80	May 15	Issaquah Creek
Yearling				

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Issaquah Creek (08.0178)
Release point: Issaquah Creek, RM 3
Major watershed: Lake Washington
Basin or Region: Puget Sound

10.3) Actual numbers and sizes of fish released by age class through the program.

Release year	Eggs/ Unfed Fry	Avg size	Fry	Avg size	Fingerling	Avg size	Yearling	Avg size
1988			3,179,500	318 fpp	249,500	99 fpp		
1989	62,900	1000	1,149,200	546 fpp	1,891,200	91 fpp		
1990			3,744,400	367 fpp				
1991			3,562,800	340 fpp				
1992			1,103,600	340 fpp	1,282,500	133 fpp		
1993					1,836,100	85 fpp		
1994					1,876,500	66 fpp		
1995			177,471	313 fpp	2,003,000	70 fpp		
1996			158,000	543 fpp	2,033,353	72 fpp		
1997					1,694,052	79 fpp		
1998			683,800	675 fpp	2,042,400	80 fpp		
1999					2,172,100	75 fpp		
2000					1,522,377	63 fpp		
2001					2,194,773	71 fpp		
Average					1,733,155	82 fpp		

10.4) Actual dates of release and description of release protocols.

The fish are released the third week of May usually on a day of high water flows. They are released volitionally, at first, then forced during high flows. No culling procedures are applied.

10.5) Fish transportation procedures, if applicable.

None

10.6) Acclimation procedures.

Fish are incubated/reared strictly on Issaquah Creek water.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

All of these fish are currently being 100% mass marked by removing their adipose fin.

WDFW shall apply coded-wire tags to a portion of the sub-yearling fall chinook production at Issaquah Hatchery to allow for evaluation of fishery contribution, survival rates and straying levels to other Puget Sound watersheds.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

None

10.9) Fish health certification procedures applied pre-release.

Fish Health staff evaluate the stock a maximum of 2 weeks prior to release to determine if it is appropriate to plant them.

10.10) Emergency release procedures in response to flooding or water system failure.

In the case of a catastrophic event condition critical to the fish's survival, health would be monitored and, if deemed necessary, the fish would be released prematurely to prevent their loss in the ponds.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

The fish are released the third week of May (smolting) usually on a day of high water flows to: 1) encourage their migration downstream; 2) to reduce the impacts of interaction with wild fish and 3) to minimize their exposure to predation.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

Note: See section 1.10 for Monitoring and Evaluation. The purpose of a monitoring program is to identify and evaluate the benefits and risks which may derive from the hatchery program. The monitoring program is designed to answer questions of whether the hatchery is providing the benefits intended, while also minimizing or eliminating the risks inherent in the program. A key tool in any monitoring program is having a mechanism to identify each hatchery production group.

Each production group shall be identified with distinct otolith marks, adipose clips, coded wire tags, blank wire tags or other identification methods as they become available, to allow for evaluation of each particular rearing and/or release strategy. This will allow for selective harvest on hatchery stocks when appropriate, monitoring of interactions of hatchery and wild fish wherever they co-mingle in riverine, estuarine and marine habitats and assessment of the status of the target population. WDFW shall monitor the Chinook salmon escapement into the target and non-target Chinook populations to estimate the number of tagged, un-tagged and marked fish escaping into the river each year and the stray rates of hatchery Chinook into the rivers.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

WDFW shall monitor chinook escapement upon return as adults to estimate the numbers of tagged, untagged and mass marked fish escaping to the river each year not only in Issaquah Creek, but into other Lake Washington tributaries (Cedar River, for example). Need to coded-wire tag a portion of the release group to evaluate catch contribution, run timing, migration patterns, total survival and straying into other watersheds of the Issaquah Creek chinook. Also, need to monitor whether or not the smolts released from Issaquah Creek are migrating immediately to the Ballard Locks or are they spending time in the lake where they may be posing a risk to natural-origin chinook salmon.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

Funding and resources are currently committed to monitor and evaluate this program as detailed in the Resource Management Plan for Puget Sound Chinook Salmon Hatcheries (Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, August 23, 2002).

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring and evaluation will be undertaken in a manner which does not result in an unauthorized take of listed chinook.

SECTION 12. RESEARCH

12.1) Objective or purpose.

None

12.2) Cooperating and funding agencies.

12.3) Principle investigator or project supervisor and staff.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

12.6) Dates or time period in which research activity occurs.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

12.8) Expected type and effects of take and potential for injury or mortality.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

12.10) Alternative methods to achieve project objectives.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

SECTION 13. ATTACHMENTS AND CITATIONS

Washington Department of Fisheries (WDF). 1939. Annual Report for 1938. Washington Department of Fisheries. Seattle, Wa.

Marshall, Anne R. 1999. Genetic Analysis of Bear Creek/Cottage Lake Creek Naturally Spawning Fall-Run Chinook. Washington Department of Fish & Wildlife Genetics Unit. 8 p.

Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife, Olympia.

Washington Department of Fish and Wildlife. 1996. Fish Health Manual. Hatcheries Program, Fish Health Division, Washington Department of Fish and Wildlife, Olympia.

Washington Department of Fish and Wildlife and Puget Sound Treaty Tribes, 2002, "Puget Sound Chinook Salmon Hatcheries, Resource Management Plan", a component of Comprehensive Chinook Salmon Management Plan, August 23, 2002. 103 pages.

Washington Department of Fish and Wildlife and Washington Treaty Indian Tribes. 1998. Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State. Olympia

Washington Department of Fish and Wildlife and Washington Treaty Indian Tribes. 2001. Current Brood Document.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Chinook ESU/Population: Puget Sound Activity:Fingerling Chinook Program				
Location of hatchery activity: Issaquah Creek Dates of activity: August to June Hatchery program operator: WDFW				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)			Unknown	
Intentional lethal take f)				
Unintentional lethal take g)	Unknown	Unknown	Unknown	
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.